

Abx  
Cm  
controller 104, such as distributing the appropriate time management signals, e.g., the official time.”

---

REMARKS

Claims 1-38 were presented for examination December 8, 2000. In an Office Action of April 25, 2002, the Examiner objected to the drawings under 37 CFR 1.83(a) stating that they do not show every feature of the invention specified in the claims and that Figure 1, item 110, did not have a text label. Claim 22 was rejected under 35 U.S.C. §112, first paragraph as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most closely associated, to make and/or use the invention. Claims 1-38 were rejected under 35 U.S.C. §102(e) as being unpatentable over U.S. Patent No. 6,012,004 to Sugano et al. (hereafter referred to as “Sugano”). Claims 1-38 are now pending without amendment.

OBJECTIONS TO DRAWINGS

On page 2, point 1, of the Official Action, the Examiner objects to the drawings under 37 CFR 1.83(a) as not showing every feature of the invention specified in the claims. Figure 3 and Figure 4 have been added as suggested by the Examiner. Informal drawings of Figure 3 and Figure 4 have been included with this amendment. Applicants will submit formal drawings upon allowance of this application. No new matter has been added by the addition of these drawings. Applicants respectfully request that the objection be withdrawn.

On page 2, point 2, of the Official Action, the Examiner objects to the drawings stating that Figure 1, item 110, does not have a text label. Applicants have included a proposed amended Figure 1 having the changes marked in red. Applicants have amended the specification to reflect the change in Figure 1. Applicants respectfully request that the objection be withdrawn.

CLAIM REJECTIONS – 35 USC § 112

On page 2, point 4, of the Official Action, the Examiner rejects claim 22 under 35 USC § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. In particular, the Examiner contends that the claim limitation of “at least one of non-master controllers initiates said arbitration in response to failing to receive one of said official time signal and said operating characteristic signal” contained in claim 22 is not in the specification and therefore is not enabled. Applicants respectfully disagree and traverse the rejection.

The claim limitation “at least one of non-master controllers initiates said arbitration in response to failing to receive one of said official time signal and said operating characteristic signal”, contained in claim 22, would be inherent in the specification to one ordinarily skilled in the art. The specification on page 10, lines 14-17 state:

The master controller 104 may be determined through an arbitration process. The arbitration process may be initiated by any of the controllers 104.

The specification then describes and enables the arbitration process on page 12, lines 24-30 continuing on page 13, lines 1-15 stating:

In the preferred embodiment, the master controller 104 generates two time management signals, the official time, and the operating characteristic signal. The master controller 104 establishes the operating characteristic, and responsively determines whether the machine is operating. In the preferred embodiment, the master controller 104 periodically broadcast the operating characteristic signal to the non-master controllers 104, e.g. once per second.

In one embodiment, the master controller, using the local clock 108, updates a local time, based upon a local time base signal generated by a local oscillator 112, in response to the machine operating. The master controller then periodically broadcasts the official time, i.e., the local time of the master controller, to the other controllers 104 to use for synchronization purposes if need be. For example, the official time may be broadcast once a minute. Therefore, each controller 104, using a local clock 108, determines and maintains a local time,

and uses the official time generated by the master controller 104, for synchronization purposes only if necessary.

This section would enable one ordinarily skilled in the art to recognize when one of the two time management signals, the official time, and the operating characteristic signal were not present. As clearly stated, in the preferred embodiment, they are periodically broadcast. Those skilled in the art to which this invention pertains would know how to determine whether a signal is being broadcast periodically.

Once it was determined that one of the official time signal and the operating characteristic signal was not broadcasting periodically, one skilled in the art would know how to enable the arbitration process through the description of the arbitration process beginning on page 10, line 7 of the specification and continuing through page 12, line 23, of the specification.

Given the above arguments, applicants respectfully request that the Examiner withdraw his rejection of claim 22 based on 35 USC § 112, first paragraph.

#### CLAIM REJECTIONS – 35 USC § 102(e)

On page 3, point 6, of the Official Action, the Examiner rejects claims 1-38 under 35 USC § 102(e) as being anticipated by Sugano. Applicants respectfully traverse the rejection as Sugano does not teach each and every claim limitation contained in applicants' claims 1-38.

Sugano teaches a system including a master controller for transmitting a counted time as a standard time, and a plurality of controllers for determining the time relating to the fault diagnosis on the basis of the received standard time when fault data of sensors, etc., are detected.

Sugano also contains a description of Japanese Unexamined Patent Publication No. 4-304589 in the Background Art Section (columns 1 and 2) and in Figure 5 that the Examiner depends upon in his rejection. This prior art is an electronic control device

for a vehicle composed of a master controller and a plurality of controllers connected to each other by a communication network. Each of the controllers has a fault detection section and a clock to log faults into the controller memories. There is no master clock in the prior art system.

Applicants' invention "includes a method and apparatus of managing time for a processing system located on a machine. The processing system includes a plurality of controllers and a communication network connecting each of the controllers. Each of the controllers has a local clock. The method includes the steps of establishing an operating characteristic of the machine, determining whether to update a local time in response to said operating characteristic, and updating said local time based upon the local clock in response to said update determination."

Applicants' claim 1 contains the limitations of "determining whether to update a local time in response to said operating characteristic; and updating said local time using the local clock in response to said update determination." The Examiner contends that Sugano teaches these limitations. Applicants respectfully disagree and contend that Sugano contains neither of these limitations.

Sugano does not have a local clock and therefore Sugano does not teach "updating said local time using the local clock in response to said update determination" as contained in Applicants' claim 1. The Examiner contends that according to column 2, lines 38-44 and claim 9, lines 1-8 that Sugano does have a local clock. With all due respect, the Examiner has misinterpreted Sugano. Column 2, lines 38-44 describes a prior art invention in Japanese Unexamined Patent Publication No. 4-304589 that contains a local clock. Claim 9, lines 1-8 describes how each individual controller saves the standard time in a storage area. The standard time being sent to the controller from a main clock not a local clock.

Although Japanese Unexamined Patent Publication No. 4-304589 contained in Sugano as prior art does have local clocks, there is no teaching that they are ever updated. Therefore, neither Sugano nor the prior art described in Sugano teach Applicants' claim 1 limitation of "updating said local time using the local clock in response to said update determination"

Applicants' specification discusses "operating characteristic" at least in part in terms of "indicative of machine, or equipment, operation, such as engine operation." (page 4, lines 28 and 29) or "indicative of whether the machine engine is running or stopped" (page 5, lines 1 and 2). The specification states "other indications of machine operation include engine oil pressure, or alternator activity, such as the alternator R terminal". The Examiner interprets a vehicle fault diagnostic apparatus for detecting a fault of at least one sensor and an actuator in Sugano as establishing an operating characteristic. Applicants submit that a detecting a fault of at least one sensor and an actuator is not equivalent to detecting an operating characteristic as discussed in applicants' specification. Detecting a fault is not always indicative of machine operation.

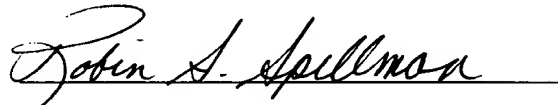
Even if Sugano did teach establishing an operating condition, Sugano does not teach determining whether to update a local time in response to said operating condition. When faults are detected in Sugano, they are stored along with the time according to the local time already stored. Local time is not updated as a result of fault detection. Rather, local time is updated as a result of each of the controllers receiving the main standard time from the main clock on a periodic basis (column 5, lines 49-53, column 7, lines 39-67, column 8, lines 1-46, Figure 4).

Since Sugano does not teach each and every claim limitation of applicants' claim 1, the rejection is improper and should be withdrawn. Similar language to that of Applicant's claim 1 is found in Applicant's independent claims 15 and 25 and for similar reasons their rejection is improper and should be withdrawn. Claims 2-14, 16-24 and 26-38 depend from allowable claims and thus their rejection is improper and should be withdrawn.

Conclusion

It is respectfully urged that the subject application is in condition for allowance and allowance of the application at issue is respectfully requested.

Respectfully submitted,

A handwritten signature in cursive script, reading "Robin S. Spellman", is written over a horizontal line.

Robin S. Spellman  
Registration No. 50,393  
Caterpillar Inc.

Telephone: (309) 675-5682  
Facsimile: (309) 675-1236



COPY OF PAPERS  
ORIGINALLY FILED 2-

RECEIVED  
AUG - 7 2002  
TECHNOLOGY CENTER 2800

**Marked Up Copy of Amendments pursuant to 37 CFR 1.121**

Title: A Method and Apparatus of Managing Time for a Processing System

Application No. 09/732,545

Attorney Docket No. 00-216

**In the Specification:**

Page 4, Lines 11-15

In addition, each of the controllers 104 may be connected to one or more elements 110. In Figure 1, the one or more elements is a speed sensor. In other embodiments [Examples of ]element[s] 110 may include one or more sensors, actuators, displays or other elements adapted to interact with a controller 104.

Page 7, Lines 29 and 30, Page 8, Lines 1-16

Referring to Figure 3, step 302, i[I]n the preferred embodiment, one of the controllers, such as a master controller 104, establishes a local time, then in step 304, broadcasts the local time to the other controllers, i.e., the non-master controllers, as the official time. The received official time is used by the non-master controllers 104 as a reference that may be used to synchronize the local time if needed. In one embodiment, step 306, the received official time is compared with the local time of the non-master controller 104. The comparison preferably includes determining the difference between the official time and the local time. If the time difference exceeds a first threshold, e.g., three minutes, then the local time may be synchronized with the official time, step 314. If the time difference is less than the first threshold then it may be determined that no synchronization is necessary, and operation may continue.

Page 8, Lines 17-30, Page 9, Lines 1-14

If synchronization is determined to be needed, then, in one embodiment, automatic synchronization may be performed by setting the local time equal to the official time. In an alternative embodiment, a determination may be made regarding whether the local time is

faster or slower than the official time, step 312. If the local time is slower, then the local time may be set equal to the official time and operation continues, step 314. If local time is faster than the official time, the local time may be held, or paused, until the time difference has been reduced or eliminated, step 316. For example, in one embodiment, the time difference between the local time and the official time is determined. If the local time is paused for synchronization, then the local time base signal, generated by the oscillator 112, is used to determine an elapsed time since the local time was held. Once the elapsed time is equal to, or within a threshold of the time difference, the local clock may resume updating the local time. This embodiment has the advantage of not needing additional updates of the official time to synchronize the local time. Alternatively an updated official time may be used to determine when the elapsed time since the local time was paused, is equal to, or within a threshold of the time difference. When the official time is equal to, or within a range of the local time, updates of the local time may continue again.

Page 9, Lines 15-21

In addition, if the comparison of the local time and official time, step 310, indicates the local time is faster than the official time by more than a second threshold, e.g., six minutes, where the second threshold is greater than or equal to the first threshold, then the local time may be set to the official time instead of holding the local time, step 322.

Page 9, Lines 22-30, Page 10, Lines 1-6

In one embodiment, if the difference between the official time and the local time, step 318, is greater than a third threshold, e.g., one hour, which is greater than or equal to the first and/or second threshold, then the local time may be manually synchronized, step 320. A service tool (not shown) may be used to manually synchronize the local time. That is, if the time difference exceeds the third threshold, a determination may be made that indicates the controller 104 is either new to the system (e.g., a replacement part), or is faulty. In either case, a service tool may be used by an operator or service technician to synchronize the local



time of the controller 104 to ensure proper operation from thereon, or if need be, to replace the controller 104.

Page 10, Lines 7-30, Page 11, Lines 1-30, Page 12, Lines 1-23

In one embodiment, a master controller 104 is established when the processing system 102 is initialized. Any controller 104 may be established as the master controller 104. However, in the preferred embodiment, the master controller 104 is able to establish the operating characteristic of the machine, e.g., whether the machine is operating, without assistance from any other controller 104. Referring to Figure 4, t[T]he master controller 104 may be determined through an arbitration process. The arbitration process may be initiated by any of the controllers 104, step 402. For example, as a controller 104 is being initialized, the controller 104 may generate an arbitration signal. In one embodiment, the arbitration signal may include a single binary bit that indicates the initiation of arbitration when it is set. In an alternative embodiment, the arbitration signal is a priority signal indicating a characteristic of the controller 104. For example, the controller characteristic may include attributes indicative of the controllers ability to establish whether the machine is operating, or whether the controller is connected to a user interface (e.g., a display, or keypad). In one embodiment, when the arbitration signal does not include any controller characteristics, then the controller 104 that generated the arbitration signal also generates a priority signal, step 404. In one embodiment, once the arbitration signal is received by a controller 104, the controller 104 compares the information contained in the received priority signal with its own priority information, step 406. If the received priority is higher, then the controller 104 will not generate its own priority signal. The receiving controller 104 will not generate its own priority signal in this instance because the controller 104 recognizes that there is a higher priority controller 104 available to be the master controller 104. Therefore, the controllers 104 compare the received priority information with their priority information, step 406. The controllers 104 recognize the master controller 104 as the controller 104 that generated the highest received priority signal, step 408. A controller 104 recognizes itself as the master controller 104, based upon having the highest priority of any received priority signal. In the

event no other priority signals are received, and there are no apparent communication failures, the controller 104 also recognizes itself as the master controller 104. In an alternative embodiment, each controller does generate its priority signal, regardless of the priority signals received up to that point, step 404. Each controller 104 compares the priority signals received with its own priority signal, step 406. If the receiving controllers priority is greater than all the other priority signals received, then the receiving controller 104 establishes itself as the master controller 104, step 408. For example, the controller 104 may compare the characteristics included in the priority signal with its own controller characteristics and, determine which controller 104 is of higher priority. For example, the priority information may simply be whether the controller 104 is able to directly establish the operating characteristic, e.g., machine operation by being directly connected to an engine speed sensor. In this case, then if one controller 104 is unable to directly establish the machine is operating and another controller is able to, then the controller 104 being able to directly establish machine operation will be of higher priority. If one or more of the received priority signals indicates another controller 104 is better suited to be the master controller 104, the controller 104 recognizes that another controller 104 will become the master controller. The controller 104 that determines to become the master controller 104 then begins the responsibilities of the master controller 104, such as distributing the appropriate time management signals, e.g., the official time.